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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/072,811	02/08/2002	Yiqiong Wang	LIGHT1900-2 (LIGHT1901)	1062
7590 10/28/2003			EXAMINER	
Law Offices of Travis L. Dodd A Professional Corporation 2490 Heyneman Hollow Fallbrook, CA 92028			CULBERT, ROBERTS P	
			ART UNIT	PAPER NUMBER
			1763	

DATE MAILED: 10/28/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/072,811

Applicant(s)

WANG, YIQIONG

Examiner

Roberts Culbert

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 25 August 2003.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-41 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-41 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.  
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).  
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

## DETAILED ACTION

### *Information Disclosure*

The examiner requests that in response to this office action, the applicant indicate which references provided by applicant illustrate, describe, or otherwise teach the Bosch process mentioned in paragraph 4 of the applicant's specification. If any such references have not been previously provided by applicant or cited by the examiner in this or any previous office action, applicant is requested to provide the references and any other known documents that are relevant to the Bosch process, as they are considered relevant to the prosecution of the instant application. The examiner considers U.S. Patents 5,498,312; 5,501,893; 6,284, 148; and 6,303,512, to Laermer et al. and assigned to Robert Bosch GmbH, to be illustrative of the Bosch process. If the applicant disputes this assertion, it is requested that an reasoned explanation of any differences also be provided in response to this office action.

### *Continued Examination Under 37 CFR 1.114*

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 8/25/03 has been entered.

### *Response to Arguments*

Applicant's arguments filed 8/25/03 have been fully considered but they are not persuasive.

In response to applicant's argument that there is no teaching in the references that the specified etching composition can provide the smoothness levels set forth in the claims, the fact that applicant has recognized another advantage which would flow naturally from following the suggestion of the prior art cannot be the basis for patentability when the differences would otherwise be obvious. See *Ex parte Obiaya*, 227 USPQ 58, 60 (Bd. Pat. App. & Inter. 1985).

Although the rejections of the previous office action are considered valid, new rejections based on the closest available prior art have been recited below.

***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 13, 14, and 36 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 13 and 14 recite the limitation "the one or more other media". There is insufficient antecedent basis for this limitation in the claim. For the purpose of examination, it is assumed that claims 13 and 14 depend on claim 12, and not claim 1 as recited.

Claim 36 recites the limitation, "wherein the mask is formed" There is insufficient antecedent basis for this limitation in the claim.

***Claim Rejections - 35 USC § 102***

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

**Claims 1-18, 21-27 and 29-41 are rejected under 35 U.S.C. 102(e) as being anticipated by U.S. Patent 6,303,512 to Laermer.**

Laermer teaches a method of forming vertical features (Fig.1) in silicon by forming a mask over a light-transmitting medium (Fig 2), applying an etching medium including a fluorine-containing gas, one or more partial passivants, and oxygen. Laermer teaches that the fluorine containing gas may be SF<sub>6</sub> or NF<sub>3</sub> optionally mixed with argon (Col. 2, Lines 37-40). Oxide formers such as oxygen and a secondary reactant such as SiF<sub>4</sub> are also optionally used for sidewall passivation (Col. 2, Lines 40-53). Laermer

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also teaches that  $\text{CHF}_3$ ,  $\text{C}_4\text{F}_8$ ,  $\text{CF}_4$ ,  $\text{C}_2\text{F}_6$ , or  $\text{C}_3\text{F}_8$  may be added to the gas mixture to accelerate the breakdown of Si compounds (Col. 3, Lines 52-56). Laermer teaches that the pressure for the etching composition is 15 mTorr in inductively coupled plasma in one exemplary embodiment (Col. 5, Lines 46-51). Laermer further teaches that the ratio of partial passivant to fluorine containing gas may be 0.5 to 20 or 0.1 to 100. See (Col. 4, Lines 15-25) of Laermer for provided ranges. Laermer also teaches that the composition may be applied continuously or in an alternating fashion (Col. 1, Lines 30-57; and Col. 4, Lines 20-37).

Laermer does not teach the limitation of smoothness, however, it may be assumed that the limitation is inherent in Laermer because smoothness is a latent property resulting from the method steps, and the method steps of Laermer are the same as in the claimed invention.

Laermer does not teach that the etched silicon pattern may be used as a waveguide; however, the limitation is seen only as intended use since the claimed method does not provide any manipulative difference as compared to Laermer. A recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. In a claim drawn to a process of making, the intended use must result in a manipulative difference as compared to the prior art. See *In re Casey*, 152 USPQ 235 (CCPA 1967) and *In re Otto*, 136 USPQ 458, 459 (CCPA 1963).

Regarding claims 18, 36 and 37, Laermer shows the formation of a plurality of ridge structures that may be used as waveguides (Fig 1).

#### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said

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subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

**Claims 1-41 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 6,303,512 to Laermer.**

As applied above, Laermer teaches the method of the invention substantially as claimed, but does not teach the limitations of claims 19, 20, and 28.

Regarding claims 19 and 20, Laermer does not teach the type of mask used. However, Official Notice is taken of the fact that both oxide and photoresist masks are known in the art for the purpose of masking silicon for a plasma etch. It would have been obvious to one of ordinary skill in the art at the time of invention to use either a photoresist or oxide mask since they are well known in the art to be suitable for the claimed method.

Regarding claim 28, Official Notice is taken of the fact that obtaining starting materials from a supplier is well known in the art of semiconductor fabrication. It would have been entirely obvious to one of ordinary skill in the art at the time of invention to obtain starting materials from a supplier in order to simplify the fabrication process.

**Claims 1-41 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 6,303,512 to Laermer in view of the admitted prior art.**

Laermer teaches a method of forming vertical features (Fig.1) in silicon by forming a mask over a light-transmitting medium (Fig 2), applying an etching medium including a fluorine-containing gas, one or more partial passivants, and oxygen. Laermer teaches that the fluorine containing gas may be  $\text{SF}_6$  or  $\text{NF}_3$  optionally mixed with argon (Col. 2, Lines 37-40). Oxide formers such as oxygen and a secondary reactant such as  $\text{SiF}_4$  are used for sidewall passivation (Col. 2, Lines 40-53). Laermer also teaches that  $\text{CHF}_3$ ,  $\text{C}_4\text{F}_8$ ,  $\text{CF}_4$ ,  $\text{C}_2\text{F}_6$ , or  $\text{C}_3\text{F}_8$  may be added to the gas mixture to accelerate the breakdown of Si compounds (Col. 3, Lines 52-56). Laermer teaches that the pressure for the etching composition is 15 mTorr in inductively coupled plasma (Col. 5, Lines 46-51). Laermer further teaches that the ratio of partial passivant to fluorine containing gas may be 0.5 to 20 or 0.1 to 100. See (Col. 4, Lines 15-25) of Laermer

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for provided ranges. Laermer also teaches that the composition may be applied continuously or in an alternating fashion (Col. 1, Lines 30-57; and Col. 4, Lines 20-37).

Although Laermer does not explicitly teach the limitations, obtaining a light-transmitting medium positioned over a base (Claim 22) or forming waveguide surfaces (claims 1 and 22), applicant has admitted (paragraph 4 of specification) that the sidewalls of a waveguide are often formed by etching an optical component according to the Bosch process. Since the Laermer reference appears to be an illustration of the Bosch process, it would have been obvious to one of ordinary skill in the art to use the process to form a waveguide surface since such a use is well known in the art as indicated by applicant.

The examiner requests that in response to this office action, the applicant indicate which references provided by applicant illustrate, describe, or otherwise teach the Bosch process mentioned in paragraph 4 of the applicant's specification. If any such references have not been previously provided by applicant or cited by the examiner in this or any previous office action, applicant is requested to provide the references and any other known documents that are relevant to the Bosch process, as they are considered relevant to the prosecution of the instant application. The examiner considers U.S. Patents 5,498,312; 5,501,893; 6,284, 148; and 6,303,512, to Laermer et al. and assigned to Robert Bosch GmbH, to be illustrative of the Bosch process. If the applicant disputes this assertion, it is requested that a reasoned explanation of any differences also be provided in response to this office action.

Regarding claims 18, 36 and 37, Laermer teaches the formation of a plurality of ridge structures that may be used as waveguides (Fig 1).

Regarding claims 19 and 20, Laermer does not teach the type of mask used. However, Official Notice is taken of the fact that both oxide and photoresist masks are known in the art for the purpose of masking silicon for a plasma etch. It would have been obvious to one of ordinary skill in the art at the time of invention to use either a photoresist or oxide mask since they are well-known in the art to be suitable for the claimed method.

Regarding claim 28, Official Notice is taken of the fact that obtaining starting materials from a supplier is well known in the art of semiconductor fabrication. It would have been entirely obvious to one

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of ordinary skill in the art at the time of invention to obtain starting materials from a supplier in order to simplify the fabrication process.

### ***Double Patenting***

Claims 1-41 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 96-168 of U.S. Patent No. 09/932,253. Although the conflicting claims are not identical, they are not patentably distinct from each other as recited in further detail below.

Claim 96 of U.S. Patent No. 09/932,253 teaches all of the limitations of claim 1 of the instant application except that claim 1 includes specific partial passivants. However, the same partial passivants are listed in claim 99 of U.S. Patent No. 09/932,253.

Claim 125 of U.S. Patent No. 09/932,253 teaches all of the limitations of claim 22 of the instant application except that claim 22 includes specific fluorine containing gasses. However, the same fluorine containing gasses are listed in claim 127 of U.S. Patent No. 09/932,253.

This is a provisional obviousness-type double patenting rejection.

Claims 1-41 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-42 of copending Application No. 09/845,093. Although the conflicting claims are not identical, they are not patentably distinct from each other as recited in further detail below.

Claim 1 of U.S. Patent No. 09/845,093 teaches all of the limitations of claim 1 of the instant application except that claim 1 of the instant application includes specific partial passivants. However, the same partial passivants are listed in claim 4 of U.S. Patent No. 09/845,093.

Claim 19 of U.S. Patent No. 09/845,093 teaches all of the limitations of claim 22 of the instant application except that claim 22 includes specific fluorine containing gasses. However, the same fluorine containing gasses are listed in claim 21 of U.S. Patent No. 09/845,093.

This is a provisional obviousness-type double patenting rejection.




**Conclusion**

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Roberts Culbert whose telephone number is (703) 305-7965. The examiner can normally be reached on Monday-Friday (7:30-4:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory Mills can be reached on (703) 308-1633. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

R. Culbert



GREGORY MILLS  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 1700